Each

Dart Aerospace Ltd. Monday, 10/23/2006 12:05:03 PM User: Kim Johnston **Process Sheet Drawing Name** : HIGH AFT X-TUBE 412 ^LCustomer : CU-DAR001 Dart Helicopters Services **Job Number** : 29105 : 10559 **Estimate Number** : D412664203 : NA **Part Number** P.O. Number S.O. No. : NA : D412-664-243 REV B : 10/23/2006 **Drawing Number** This Issue : N/A Project Number : NC Prsht Rev. : NA : LANDING GEAR : B Type **Drawing Revision** First Issue :N/A : 29104 Material **Previous Run** : 11/22/2006 Qty: 1 Um: **Due Date** Written By Checked & Approved By Reformat; Added D3189-1 K/DS Comment Est Rev:F 06-03-29 Remove Coments on Pick List JLM **Additional Product** Job Number: Description: Seq. #: Machine Or Operation: DOCUMENT CONTROL DC 1.0 Comment: DOCUMENT CONTROL Photocopy bluefile and create labels as per PPP D412-664-203 CHG-003 355 Crosstube Material 2.0 D6009129 1.0000 Each(s)/Unit Total: 1.0000 Each(s) Comment: Qty.: Qty Part number Description Batch 1 D6009-129 Crosstube **7566** Check OD = 3.500"; ID = 2.250" MORI SEIKI CNC LATHE LARGE MORI SEIKI 3.0 Comment: MORI SEIKI CNC LATHE LARGE 1-Fill tube with sand & install plugs DT8534 on both ends as per Folio FA166

2-Turn first side as per Folio FA166

4.0 QC1



INSPECT ALL DIM TO DIM SHEET



Comment: INSPECT ALL DIM TO DIM SHEET

MS 06/11/11

W/O:		·····	-	WORK ORDER	CHANGES					
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NCR:	,	WORK ORDER NON-CONFORMANCE (NCR)									
		Description of NC		Corrective Action Section B		Vifi4i					
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Monday, 10/23/2006 12:05:03 PM Date: ⊌ser: Kim Johnston **Process Sheet** Drawing Name: HIGH AFT X-TUBE 412 Customer: CU-DAR001 Dart Helicopters Services Part Number: D412664203 Job Number: 29105 Job Number: Description: Seq. #: Machine Or Operation: MORI SEIKI CNC LATHE LARGE 5.0 MORI SEIKI Comment: MORI SEIKI CNC LATHE LARGE 1-Turn second side as per Folio FA166 2-Deburr & Inspect for surface damage. Repair damage within limits as per Dwg D412-664-243. 06-12-11 4- Remove sand and plugs 5-Scribe part # and batch # using vibrating stylus as per Dwg D412-664-243 Inside of Cuff(Donot engrave on outside of tube) INSPECT ALL DIM TO DIM SHEET QC1 6.0 SECOND CHECK 7.0 QC8 06/12/11 Comment: SECOND CHECK HAND FINISHING! HAND FINISHING RESOURCE #1 8.0 Comment: HAND FINISHING RESOURCE #1 Chemical Conversion Coat as per QSI 005 4.1 QC3/5 Comment: Inspect work & Chemical conversion Coat) BENDING MACHINE 10.0 Comment: BENDING MACHINE Bend tube as per Dwg D412-664-243 using CNC bender program 412-af and Folio FT010 DIMENSIONAL CHECK QC6 11.0 Comment: DIMENSIONAL CHECK

W/O: WORK ORDER CHANGES							· · · · · · · · · · · · · · · · · · ·
DATE	STEP	PROCEDURE CHANGE	Ву	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector
07-01-16	11.0	Aconitive dimension approval from engineering DO NOT PASS STEP. 14.0		07·01·17	1	07016	10701-16

Part No:	PAR #:	Fault Category:	NCR: Yes	No	DQA:	Date:
			QA: N	I/C C	losed:	Date:

NCR:	WORK ORDER NON-CONFORMANCE (NCR)							
		Description of NC		Corrective Action Section 8	3	Verification	Ammanal	Ammenal
DATE	STEP	Section A	Initial Chief Eng	Action Description Chief Eng	Sign & Date	Section C	Approval Chief Eng	Approval QC Inspecto
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Monday, 10/23/2006 12:05:04 PM Date: User: Kim Johnston **Process Sheet** Customer: CU-DAR001 Dart Helicopters Services Drawing Name: HIGH AFT X-TUBE 412 Part Number: D412664203 Job Number: 29105 Job Number: Seq. #: **Machine Or Operation:** Description: LANDING GEAR RESOURCE 1 LANDING GEAR 1 12.0 Comment: LANDING GEAR RESOURCE 1 1-Drill pilot holes in tube as per Dwg D412-664-243 using drill Jig DT8550 & DT8551 ST07-01-15 2-Ream hole to finish size in tube as per Dwg D412-664-243using drill Jig DT8550 & DT8551.Check dimensions between holes, both sides on both cuffs, to ensure alignment with saddle holes. 3-Deburr & Inspect for surface damage. Repair damage within limits as per Dwg D412-664-243 HAND FINISHING RESOURCE #1 HAND FINISHING1 13.0 Comment: HAND FINISHING RESOURCE #1 07-01-27 Chemical Conversion Coat as per QSI 005 4.1 14.0 QC3 INSPECT POWDER COAT/CHEMICAL CONVERSION POWDER COAT/CHEMICAL CONVERSION Comment: INSPEC INSPECT WORK TO CURRENT STEP 15.0 QC5 Comment: INSPECT WORK TO CURRENT STEP OUTSIDE SERVICES 16.0 Comment: Sub-Contracting OUTSIDE SERVICES Liquid Penetrant Inspection as per QSI 038Or C 207/01/23 D Issue P/O: 29/5 LPI as per ASTM 1417 Level 2 Attach copy of NDT results to work order 17.0 PACKAGING 1 PACKAGING RESOURCE #1 Comment: PACKAGING RESOURCE #1 Inspect for transit damage Ensure copy of NDT results attached to work order. POSITIVE RECALL

POSITIVE RECALL

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DATE	STEP	Section A	Initial Chief Eng	Action Description Chief Eng	Sign & Date	Section C	Chief Eng	Approval QC Inspector	
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Monday, 10/23/2006 12:05:04 PM Date: User: Kim Johnston **Process Sheet** Drawing Name: HIGH AFT X-TUBE 412 Customer: CU-DAR001 Dart Helicopters Services Part Number: D412664203 Job Number: 29105 Job Number: Description: Seq. #: **Machine Or Operation:** INSPECT WORK TO CURRENT STEP QC5 18.0 Comment: Inspect for damage & ensure results are as per Dwg D412-664-203 SPRAY PAINTING 19.0 Comment: SPRAY PAINTING 1-Prime inside and outside crosstube as per QSI 005 4.2 M/ 01 02 02 2-Paint outside crosstube with White Imron as per QSI 005 4.2 W Inspect Spray Paint QC14 20.0 Comment: Inspect Spray Paint Wrap in plastic bag to protect from scratches Abrasion Strip 21.0 Comment: Qty.: 1.7640 f(s)/Unit Total: 1.7640 f(s) Pick: Qty Part number Description Batch 2 D2856-600(Cut to 10.090") Abrasion Strip 22.0 D2856600 Abrasion Strip Total: 1.0080 f(s) Comment: Qty.: 1.0080 f(s)/Unit NA IT way raband Oty-Part number 1 D2856-600(Culto 10.870") Support 23.0 D28961 Total: Comment: Qty.: 1.0000 Each(s)/Unit 1.0000 Each(s) Pick: **Description Batch** Qty Part number 07.02.22 Support 29705 1 D2896-1

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W/O:			W	ORK ORDER CHANGES					
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Monday, 10/23/2006 12:05:04 PM Date: Kim Johnston User: **Process Sheet** Drawing Name: HIGH AFT X-TUBE 412 Customer: CU-DAR001 Dart Helicopters Services Job Number: 29105 Part Number: D412664203 Job Number: Machine Or Operation: Description: Seq. #: Chafing Shield D31891 24.0 Comment: Qty.: 2.0000 Each(s)/Unit Total: 2.0000 Each(s) Pick: Qty Part number Description Batch Chafing Sheild B 27414 2 D3189-1 Clamp(per MIL-DTL-8783C) 25.0 MS2192028 4.0000 Each(s)/Unit Total: 4.0000 Each(s) Comment: Qty.: Pick: Qty Part number Description Batch 4 MS21920-28 Clamp MIOL684 clamp(per MIL-DTL-8783C) MS2192030 26.0 2.0000 Each(s)/Unit Total: 2.0000 Each(s) Comment: Qty.: Pick: Qty Part number Description Batch Clamp [0293] at 07-02-22 2 MS21920-3Q LANDING GEAR RESOURCE 1 LANDING GEAR 1 Comment: LANDING GEAR RESOURCE 1 Assemble as per Dwg D412-664-203 28.0 QC5 Comment: INSPECT WORK TO CURRENT STEP PACKAGING ' PACKAGING RESOURCE #1 29.0 Comment: PACKAGING RESOURCE #1 Pick Packing Kit 30.0 AN640A Bolt Comment: Qty.: 4.0000 Each(s)/Unit Total: 4.0000 Each(s) Bolt

W/O:			WO	RK ORDER CHANGE	S				
DATE	STEP	PRO	CEDURE CHAN	IGE	Ву	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector
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DATE	STEP	Description of NC	Initial	Corrective Action Section Action Description	n B Sign &	Verifica		Approval	Approval
		Section A	Chief Eng	Chief Eng	Date	Section	C	Chief Eng	QC Inspector

	Johnston Process Sheet	
Customer:	CU-DAR001 Dart Helicopters Services Drawing Name: HIGH A	FT X-TUBE 412
. Job Number:	29105 Part Number: D41266	4203
Job Number:		
Seq. #:	Machine Or Operation: Description AN641A Bolt	:
31.0	AN641A Bolt	
Comme	Bolt Batch: \(\frac{101418}{2.0000} \) Each(s)/Unit Total : 2.0000 Each(s)	
32.0	AN960JD616 Washer	
Comme	###: Qty.: 18.0000 Each(s)/Unit Total: 18.0000 Each(s) Washer Batch: 102829	110111111111111
33.0	MS21042L6 Nut	
Comme	Port: Qty.: 6.0000 Each(s)/Unit Total: 6.0000 Each(s) Nut Batch: 100151	162/280
34.0	QC4 INSPECT 100% KITS FOR COMPLETEN	fess /
35.0	PACKAGING 1 PACKAGING RESOURCE #1	11128
Comme	Int: PACKAGING RESOURCE #1 Identify and pack for shipping as per PPP D412-664-203	1
	Location:	Mostor 1280
36.0	QC21 FINAL ÎNSPECTION/W/O RELEASE	
Comme	nt: FINAL INSPECTION/W/O RELEASE	12007/03/01
Job Completion		W 07.02.28

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W/O:			W	ORK ORDER CHAN	GES					
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						QA: N	/C Close	d:	_ Date: _	
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DART AEROSPACE LTD	Work Order:	29105
Description: Crosstube Assembly (412 High Aft)	Part Number:	D412-664-243
Inspection Dwg: D412-664-243 Rev: B		Page 1 of 1

FIRST ARTICLE INSPECTION CHECKLIST

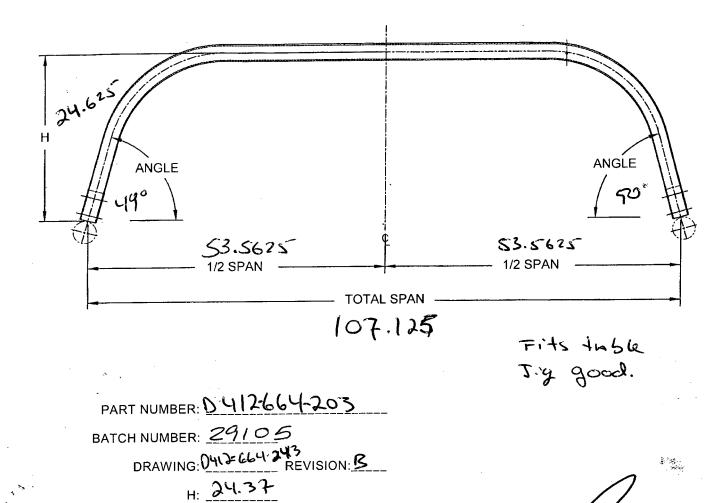
X First Article Prototype

Inspection Sheet Drawing Dimension		Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
D16		0.0054.0.000					
	2.684	+0.005/-0.000	2.689				
	2.748	+0.005/-0.000	2.752				
ŀ	2.884	+0.005/-0.000	2.888				
	3.019	+0.005/-0.000	3.024				
	3.163	+0.005/-0.000	3.167				
	3.308	+0.005/-0.000	3.312				
⋖	3.429	+0.005/-0.000	3.432				
SIDE	2.990	+0.005/-0.000	2.993	<u> </u>			
S	2.618	+0.005/-0.000	2.623				
	0.200	+/-0.010	.200	سا			
	R0.063	+/-0.010	.063				
	R0.500	+/-0.010	.5∞	<u> </u>			
	4.971	+/-0.001	4.971				
	2.684	+0.005/-0.000	2.688	ســـا			
	2.748	+0.005/-0.000	2.752				
	2.884	+0.005/-0.000	3.888				
	3.019	+0.005/-0.000	3.023	レ			
	3.163	+0.005/-0.000	3.167				
	3.308	+0.005/-0.000	3,312				
	3.429	+0.005/-0.000	3.433				
EB	2.990	+0.005/-0.000	2,994				
SIDE	2.618	+0.005/-0.000	2.623	·			
"							
	0.200	+/-0.010	.3∞				
	R0.063	+/-0.010	.063				
	R0.500	+/-0.010	,500	سي			
	4.971	+/-0.001	4.971				
	124.09	+/-0.020	124.110	<u> </u>			

Measured by: MS	Audited by:	Inl	Prototype Approval:	N/A
Date: 06/11/11	Date:	06/12/11	Date:	N/A

ſ	Rev	Date	Change	Revised by	Approved
Ī	Α	04.06.16	New Issue (P/O D412-664-203)	KJ/JLM	1
Ī	В	06.03.09	Dwg Rev updated	KJ/JLM	ad
				101	727

Crosstube Bend Dimension Sheet



DATE: 67.01.15

1/2 SPAN: 53.77

TOTAL SPAN: 107.44

ANGLE: _50°





	DESIG	DESIGN DRAWN BY PH			DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA			
	CHECK	(ED _	APPROVED	ad	DRAWING NO.	REV. B		
		#	1	1	D412-664-243	SHEET 1 OF 3		
i	DATE				TITLE	SCALE		
	05.0	2.04			CROSSTUBE ASSEMBLY (412	HI AFT) NTS		
	Α		01.10.	17	NEW ISSUE			
	В		05.02.	.04	ADD HOLES FOR COMPATAL	BILITY		

SHOP COPY

RETURN TO ENGINEERING

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SUBJECT TO AMENDMENT

WITHOUT NOTICE

WORK ORDER



Qty	Part Number	Description
X	D412-664-243	CROSSTUBE ASSEMBLY (412 HIGH AFT)
1	D6009-129	CROSSTUBE
1	D2896-1	SUPPORT
2	D2856-600-1009	ABRASION STRIP
- 1	D2856-600-1087	ABRASION STRIP
4	MS21920-28	CLAMP
2	MS21920-30	CLAMP
2	D3189-1	CHAFING SHIELD

GENERAL NOTES:

1) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.

2) MATERIAL: MANUFACTURED FROM D6009-129

FINISHED LENGTH = 124.09±0.020

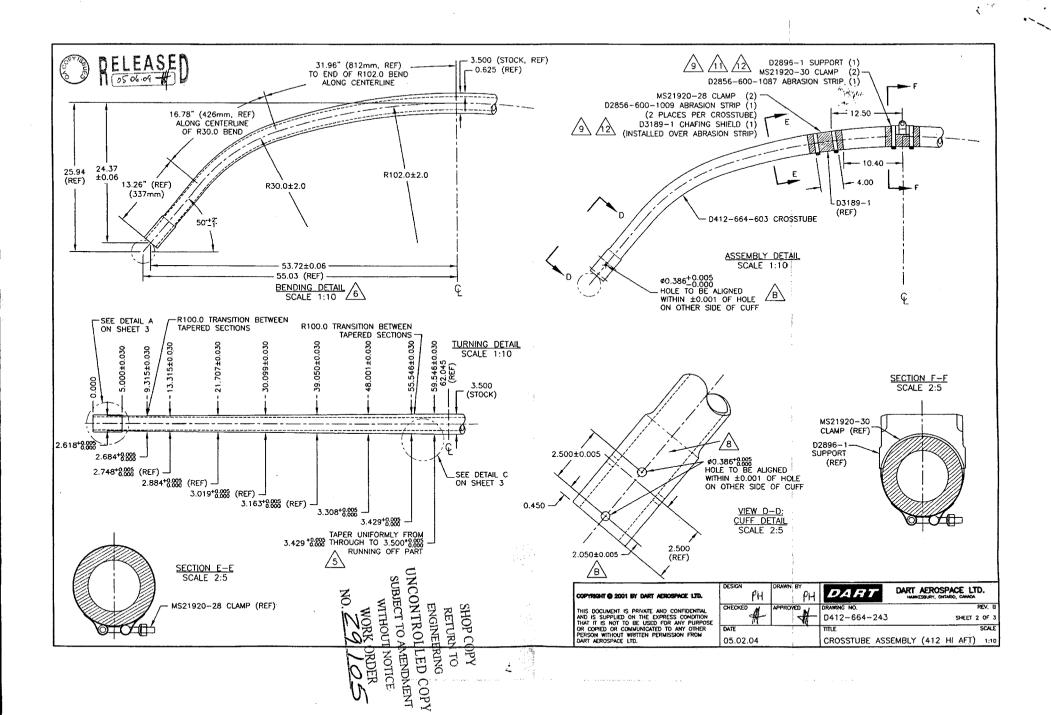
3) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
PAINT OUTSIDE PER DART 005 4.2

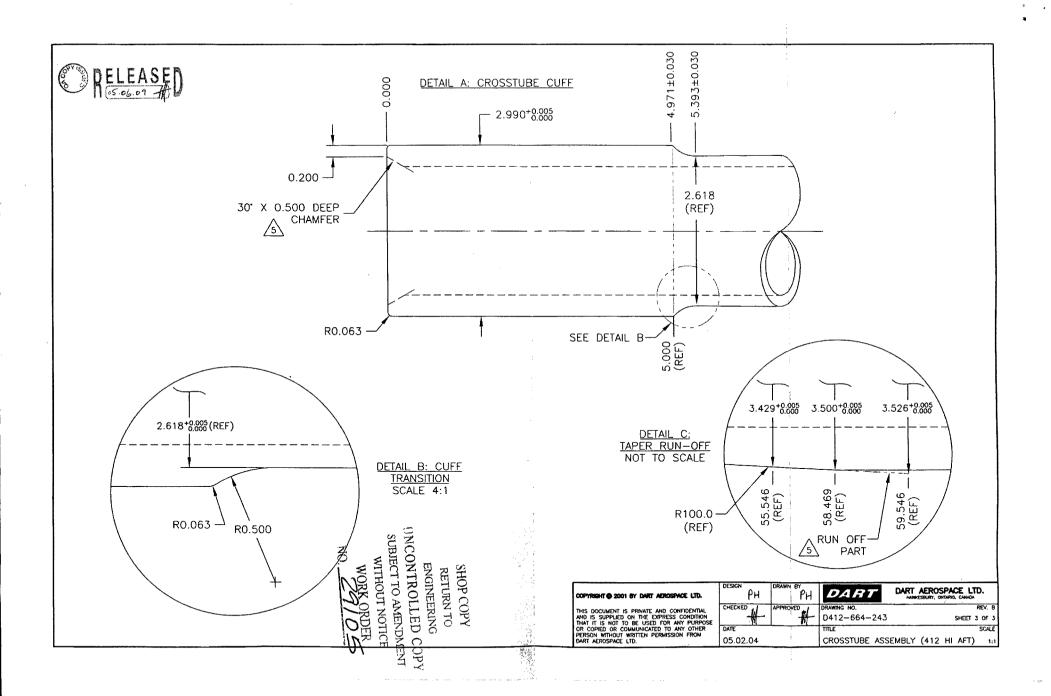
4) PART IS SYMMETRIC ABOUT CENTERLINE.

- 5) RUN-OFF PART, BLEND OUT EDGE LONGITUDINALY, TRANSITION SHOULD BE SMOOTH.
- 6) BEND PROGRESSIVELY WITH A MINIMUM OF 8 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
- LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.
- 8) SCRIBE DART PART NUMBER AND BATCH NUMBER IN THIS AREA WITH VIBRATING STYLUS.
- 9) INSTALL D2856-600-1009 AND D2856-600-1087 ABRASION STRIPS WITH A 0.13 (REF) GAP ON BOTTOM SIDE OF CROSSTUBE, CENTERED OPPOSITE D2896-1 SUPPORT, PER QSI 035.
- 10) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.
- 11) IT IS OPTINAL TO TO SEAL EDGES OF SUPPORTS USING SIKAFLEX-241/291 SEALANT.
- 12) TORQUE CLAMPS 80 TO 100 IN-LB.

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Jason Murdoch

David Shepherd [dshepherd@dartaero.com] From:

Wednesday, January 17, 2007 2:58 PM Sent:

'Jason Murdoch' To: 'Lacelle, Linda' Cc: Subject: RE: Drawings

Jason,

I agree with your assessment. B29531, B27989, B29105, and B29506 are acceptable deviations. B27390 should be scrapped.

I have tried to assemble the landing gear with large variations in angle between fwd and aft crosstube (ie. 48 to 51 degrees) and have found that installation is acceptable. Therefore, I think these tubes are OK.

David

From: Jason Murdoch [mailto:jmurdoch@dartaero.com]

Sent: Wednesday, January 17, 2007 6:34 AM

To: 'David Shepherd' Subject: FW: Drawings

The tubes fit the tables very well apart from B27390, which I think is scrap. Is it cool to sign off on the rest of them, I think they're good. But are the angles going to be an issue upon installation?

imurdoch@dartaero.com

O.C. COORDINATOR

From: Jason Murdoch [mailto:jmurdoch@dartaero.com]

Sent: Monday, January 15, 2007 12:38 PM

To: 'David Shepherd' Subject: FW: Drawings

How are these dims for your liking? These are the ones that I wanted you to look at.

imurdoch@dartaero.com

Q.C. COORDINATOR

From: Brigitte Golden [mailto:bgolden@dartaero.com]

Sent: Monday, January 15, 2007 10:48 AM

To: imurdoch@dartaero.com

Subject: Drawings



LABOUR MATERIALS

TRAVEL EXPENSES

HOTEL EXPENSES

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W.O. $N_{\bar{0}}$ 35629

A.M.O. Number: 46/90

_DECTRUCT

14014-1	LOINU	CIIVE	E211	NG REF	PORT	
	AIRCRAFT	/COMPONENT	INFORMA	TON.		
REGISTRATION:	MODEL/TYPE:		S	ERIAL NUMBER:		
TOTAL HR/LDG:	OPERATED BY:			BASED AT:		
	INS	PECTION REQUI	RAVIENTS			
Carry out FPI of (10) Section 4.1.1 (on file Qty (1) P/N D212-60 Qty (3) P/N D212-60 Qty (6) P/N D412-60	cross tube (externa at client) - parts del 64-101 S/N B2798 64-201 S/N's B279	l surface) as per A livered to HeathAir 7	STM E-1417 r.	7-05 and the Dart Q		
RADIOGRAPHY	ULTRASONIC	PENETRANT	MAG	NETIC PARTICLE	EDDY CURRENT	
Fluorescent penetrant inspection was performed in accordance with the above requirements on (10) cross tubes. Note: A Level 3 penetrant was substituted for the requested Level 2 (3 is more sensitive) Ardrox 970P25E Batch #04B503. Two (2) cross tubes (P/N D212-664-201) FAILED inspection. Areas marked on cross tubes (S/N's B29506 & B29531). To be reinspected following repair. Eight (8) cross tubes PASSED inspection.						
THE MAINTENANCE TH INSPECTED BY:	DESCRIBED ABOVE HAS BEEN PE IE APPLICABLE STANDARDS OF AI	RFORMED IN ACCORDANCE W. IRWORTHINESS	<i>т</i> н	DATE January 2 INSPECTION Not Rec		
USTOMER: Dart Aerospace	GUST	OMER INFORMA	ATION	P.O. NUMBER 291 CONTACT NAME:	5)	

@ **PST** INVOICE NO. TOTAL \$ WHITE COPY – INSPECTION FILE • YELLOW COPY – CUSTOMER • PINK COPY – ACCOUNTANT

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